REMARKS

Claims 65-67, 74, 77-81, and 83-96 are pending in the application with claims 78, 83, and 84 amended herein, claim 82 canceled herein, and new claims 86-96 added herein.

Claims 74 and 78 stand rejected as being anticipated by Nakamura. Applicant traverses and requests reconsideration.

Claim 74 sets forth a capacitor that includes, among other features, a dielectric layer between first and second capacitor electrodes, wherein at least one of the first and second capacitor electrodes include roughened platinum, the roughened platinum having a continuous surface characterized by columnar pedestals having heights greater than or equal to about one-third of a total thickness of the roughened platinum. Pages 2-3 of the Office Action state that Nakamura discloses roughened platinum. Pursuant to 37 CFR 1.104(c)(2), the particular part of a reference relied on must be designated and the pertinence of each reference must be clearly explained. However, the Office Action merely refers to "Figs. 1-35 (especially Figs. 2, 3A, 7-10D, and 24-32)." Review of the listed figures does not reveal any structures depicting roughened platinum. Even review of the text associated therewith (which apparently is not relied upon by the Office) merely reveals a reference to the "columnar crystal structure" of platinum without any reference to roughened platinum, as claimed. Because the rejection of claim 74 fails to comply with 37 CFR 1.104(c)(2) by clearly explaining the pertinence of Nakamura, such rejection is defective and should be withdrawn.

In addition, those of ordinary skill readily recognize that some materials exhibit columnar growth during deposition. However, mere disclosure of platinum

exhibiting a columnar crystal structure does not necessarily disclose roughened platinum. It appears that the Office might be taking the position that the platinum columnar crystals of Nakamura inherently disclose the subject mater of claim 74. Applicant disagrees. "The mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency." In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (citations omitted) (emphasis in original); MPEP § 2112. Further, "[i]n relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis added); MPEP § 2112.

Applicant already asserted above that the rejection fails to explain the pertinence of Nakamura in disclosing roughened platinum. Applicant further asserts that the Office does not provide any basis in fact or technical reasoning to support a determination that a columnar crystal structure necessarily discloses roughened platinum. Accordingly, Nakamura cannot be considered to disclose the roughened platinum of claim 74.

Applicant asserts that the figures of Nakamura cited in the Office Action merely describe the type of platinum material shown in Fig. 5 and discussed on page 13, lines 11-21 of the present specification. The Fig. 5 material is not roughened platinum and has a much smoother surface in comparison to the roughened platinum shown in Fig. 4 of the present specification. Even so, the Fig. 5 material exhibits small bumps on its surface corresponding to the crystal

structure of the as-deposited material. Applicant asserts that no evidence or technical reasoning can be asserted to establish that the columnar crystal structure of the platinum material described in Nakamura differs from the platinum material shown in Fig. 5 of the present specification. Since Fig. 5 does not disclose roughened platinum, Nakamura cannot be considered to disclose roughened platinum.

Page 7 of the Office Action admits that Nakamura does not teach the thickness of the platinum layer or the height of columnar crystals. Applicant asserts that Nakamura does not otherwise provide any information to reasonably allege that the columnar crystals necessarily form roughened platinum. The small bumps shown in the Nakamura figures are no different than the small bumps shown in Fig. 5 of the present specification and do not teach a roughened surface.

Page 11, line 19 to page 13, line 21 of the present specification describe processing conditions that can be used to produced roughened platinum and contrasts them with processing conditions that do not produce roughened platinum. Thorough review of Nakamura reveals that such reference does not provide any recognition that altering process conditions can change the surface roughness of platinum material. Nakamura especially does not recognize that roughened platinum can be produced using certain process conditions. Since Nakamura does not provide any disclosure of how roughened platinum might be produced and does not expressly disclose such material, it would be improper to conclude that Nakamura discloses roughened platinum. Anticipation requires

disclosure of each and every element. At least for the reasons described above, Nakamura does not anticipate claim 74.

New claims 88 and 89 depend from claim 74 and are not anticipated at least for such reasons as well as the additional limitations of such claims not disclosed. For example, claim 89 sets forth that the columnar pedestals have an average diameter of about 200 Angstroms as described on page 13, lines 2-8. Nakamura does not provide any description of the diameter of columnar crystals.

Also for example, claim 88 sets forth that the columnar pedestals have an average diameter of at least about 200 Angstroms. Page 13, lines 18-21 describe that Figs. 4 and 5 together provide evidence that grain structure of roughened platinum can be controlled by controlling process parameters. One of ordinary skill in the art viewing the express teachings of the present specification would readily recognize support for columnar pedestals having an average diameter of at least about 200 Angstroms. The specification describes an average diameter of about 200 Angstroms and further specifies that grain structure can be controlled through process parameters. A clear implication thus exists that average diameter can be greater than 200 Angstroms.

Amended claim 78 sets forth an integrated circuit including, among other features, a conductive node location disposed within a semiconductive substrate, a first layer in electrical contact with the conductive node, and a platinum alloy layer disposed over the first layer. The platinum alloy layer is characterized by a continuous, roughened outer surface including columnar pedestal structures having heights greater than or equal to about one-third of a total thickness of the roughened platinum alloy layer. Page 3 of the Office Action alleges that

Nakamura discloses the integrated circuit of claim 78. However, amended claim 78 clearly sets forth a roughened platinum alloy layer that is not disclosed by Nakamura, as established above regarding claim 74. Claim 78 was amended by incorporating the subject matter of previous claim 82 (now canceled) that was not rejected as being anticipated by Nakamura. Accordingly, Nakamura does not anticipate claim 78.

At least for the reasons set forth above, claims 74, 78, 88, and 89 are not anticipated by Nakamura. Applicant requests allowance of such claims in the next Office Action.

Claim 74 stands rejected as being anticipated by Aoki. Applicant traverses and requests reconsideration.

The subject matter of claim 74 is discussed above. Pages 3-4 and 8-9 allege that Aoki discloses roughened platinum having a continuous surface characterized by columnar pedestals. As descried in the present specification at least at page 12, lines 3-4 and page 13, lines 18-21, the term "columnar pedestals" is characteristic of columnar growth achieved by controlling process parameters to obtain a particular grain structure. That is, the columnar pedestals of a roughened platinum refer to the grain structure of such material and not merely to a surface profile. The convex part 38a' shown in Figs. 1B-1D of Aoki are obtained by electropolishing the structure shown in Fig. 1A. Accordingly, the convex part 38a' merely describes a surface profile and does not disclose roughened platinum "characterized by columnar pedestals." Thus, Aoki does not anticipate claim 74.

In addition, pages 8-9 of the Office Action state that Applicant's previous argument against Aoki is not convincing because Aoki shows "in red-mark figures 1A-1D, a roughened platinum layer characterized by columnar pedestals." An attachment to the Office Action was provided with vertical lines added to Figs. 1A-1D by the Examiner to show columnar pedestals. However, the Office Action does not describe any support in the art for the proposition that Aoki, rather than the Examiner, discloses the columnar pedestals added to the figures by the Examiner. Even though the red-mark attachment clarifies the Office's view as to where columnar pedestals are alleged to exist, it does not constitute a teaching in the art. The Office Action must provide a teaching or suggestion in Aoki supporting the existence of the pedestals alleged by the Examiner. Applicant asserts that no such support exists.

Absent a proper showing of support in the art, it is not possible for Applicant to determine the basis by which the Office finds disclosure of columnar pedestals in Aoki. 37 CFR 1.104(c)(2) requires that the pertinence of each reference must be clearly explained. The Office Action does not provide a sufficient explanation of Aoki to understand the pertinence of such reference. The rejection of claim 74 as being anticipated by Aoki thus fails to comply with 1.104(c)(2) and should be withdrawn.

New claims 88 and 89 depend from claim 74 and are not anticipated at least for such reason as well as the additional limitations of such claims not disclosed or suggested. Claims 74, 88, and 89 are thus in condition for allowance and Applicant requests allowance in the next Office Action.

Claims 65-67, 77, and 85 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Aoki in view of Kingon. Applicant traverses and requests reconsideration.

Claim 65 sets forth an integrated circuit including, among other features, a roughened platinum layer over a silicon substrate, the roughened platinum layer having a continuous surface characterized by columnar pedestals that are at least about 300 Angstroms tall and an intervening layer between the platinum layer and the substrate. Pages 4-5 of the Office Action allege that Aoki discloses the subject matter of claim 65 except for the intervening layer and relies on Kingon as allegedly disclosing such a feature.

As established above regarding claim 74, Aoki does not disclose roughened platinum characterized by columnar pedestals and Applicant further asserts that Aoki does not suggest such features. Kingon is not alleged to disclose or suggest the roughened platinum characterized by columnar pedestals of claim 65. Accordingly, both references are deficient in the same respect and combination of the references cannot be considered somehow to disclose or suggest the feature missing from both references. At least for such reason, claim 65 is patentable over Aoki in view of Kingon. Claims 66, 67, 77, and 85-87 depend from claim 65 and are patentable at least for such reason as well as the additional limitations of such claims not disclosed or suggested. Applicant requests allowance of claims 65-67, 77, and 85-87 in the next Office Action.

Claims 78-81 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Buskirk in view of Park. Applicant traverses and requests reconsideration.

The subject matter of amended claim 78 is discussed above. Pages 6-7 of the Office Action allege that Buskirk discloses the subject matter of claim 78 except for the composition of the first layer and rely on Park as allegedly disclosing such composition. However, the Office Action does not provide any indication as to a particular part of Buskirk relied on by the Examiner in support of the alleged teaching. Pursuant to 37 CFR 1.104(c)(2), the pertinent part must be designated and the pertinence of Buskirk clearly explained. The rejection of claims 78-81 fails to comply with such requirement and should be withdrawn.

In addition, amended claim 78 now sets forth that the roughened platinum alloy layer includes columnar pedestal structures. Neither Buskirk nor Park disclose or are alleged to disclose or suggest the roughened platinum alloy layer including columnar pedestal structures, as set forth in claim 78. Since both references are deficient in the same respect, combination of the references cannot be considered to disclose or suggest the missing feature. Claim 78 was amended by incorporating the subject matter of previous claim 82 (now canceled) that was not rejected as being unpatentable over Buskirk in view of Park. At least for such reasons, claim 78 is patentable over the cited combination.

Claims 79-81, 90, and 91 depend from claim 78 and are patentable at least for such reason as well as the additional limitations of such claims not disclosed or suggested. Thus, Applicant requests allowance of claims 78-81, 90, and 91 in the next Office Action.

Claims 65-67, 77, and 79-85 stand rejected as being unpatentable over Nakamura. Applicant traverses and requests reconsideration.

Claim 82 is canceled herein. The subject matter of claim 65 is set forth above. As earlier establish regarding claim 74, Nakamura does not disclose roughened platinum. Applicant further asserts that Nakamura does not suggest roughened platinum. The Office Action does not provide any allegation supporting a finding that Nakamura nevertheless suggests the roughened platinum of claim 65 even though Nakamura does not disclose roughened platinum. At least for such reason, claim 65 is patentable over Nakamura.

Claims 66, 67, 77, and 85-87 depend from claim 65 and are patentable at for such reason as well as the additional limitations of such claims not disclosed or suggested. Claims 79-84 also rejected as being unpatentable over Nakamura depend from claim 78. Claim 78 is not rejected as being unpatentable over Nakamura. Thus, it is not possible that claims depending from claim 78 can be considered unpatentable over Nakamura. At least for such reasons, Applicant requests allowance of claims 65-67, 77, and 79-87 in the next Office Action.

New claim 92 sets forth a capacitor that includes, among other features, a dielectric layer between first and second capacitor electrodes over a monocrystalline silicon substrate and at least one of the first and second capacitor electrodes including roughened platinum formed by a particular process. The process includes flowing an oxidizing gas into a reaction chamber, flowing a platinum precursor into the reaction chamber, and chemical vapor depositing roughened platinum from the platinum precursor in the presence of the oxidizing gas. The roughened platinum has a continuous surface characterized by columnar pedestals. The process includes maintaining a temperature from about 0 C to less than 300 C during the depositing.

Applicant notes that claim 92 is an apparatus claim written in product-by-process format. The scope of the product-by-process claim is determined by the structure that results from the process set forth is such claim. Applicant asserts that none of the cited references disclose or suggest a capacitor having the structural features resulting from claim 92. Claims 93-96 depend from claim 92 and are further patentable at least for such reason as well as the additional limitations of such claims not disclosed or suggested.

Applicant herein establishes adequate reasons for allowability of pending claims 65-67, 74, 77-81, and 83-96. Applicant requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

Dated: 13 Jun 2002 By: _____
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application Serial No. 09/421,625
Filing Date ..... October 19, 1999
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Assignee .....Micron Technology, Inc.
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Examiner .....H. Vu
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Title: Circuitry and Capacitors Comprising Roughened Platinum Layers

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING PRELIMINARY AMENDMENT ACCOMPANYING A RCE FILING

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

78. (amended) An integrated circuit comprising:

a semiconductive substrate;

a conductive node location disposed within the semiconductive substrate;

a first layer disposed over the semiconductive substrate and in electrical contact with the conductive node, the first layer comprising at least one of iridium, rhodium, ruthenium, palladium, osmium, silver, alloy, IrO_2, RuO_2, RhO_2, or OsO_2; and

a platinum alloy layer disposed over the first layer, the platinum alloy layer characterized by a continuous, roughened outer surface, ~~where~~ the platinum alloy layer comprising platinum and at least one of rhodium, iridium, ruthenium, palladium, osmium or silver, and the roughened platinum alloy layer

comprising columnar pedestal structures having heights greater than or equal to about one-third of a total thickness of the roughened platinum alloy layer.

83. (amended) The integrated circuit of Claim ~~82~~ 78, the columnar pedestal structures having heights of at least 300Å.

84. (amended) The circuit of Claim ~~82~~ 78, wherein the columnar pedestals terminate in dome-shaped tops.

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